

## **RHINOCEROS AUKLET (*Cerorhinca monocerata*)**

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### **Criteria Scores**

Population Trend	Range Trend	Population Size	Range Size	Endemism	Population Concentration	Threats
0	0	7.5	5	0	10	15

### **Special Concern Priority**

Currently considered a Bird Species of Special Concern (breeding), Priority 3. Categorized as third priority by Remsen (1978), and included on CDFG's (1992) unprioritized list.

### **Breeding Bird Survey Statistics for California**

Data inadequate for trend assessment (Sauer et al. 2000).

### **General Range and Abundance**

No subspecies are recognized. Breeds along the Pacific coast of North America from the Aleutian Islands, Alaska, south to southern California, and along the Pacific coast of Asia in N. Korea, northern Japan, Sakhalin and the southern Kuril Islands (Gaston and Dechesne 1996, Kondratyev et al. 2000). At sea during the breeding season, occurs in waters from the outer continental shelf to well beyond the shelf break. During the non-breeding season, ranges widely at sea from southern Alaska south to southern California and southern Japan. World population estimates are extremely rough at 1.5 million breeding birds, with approximately 1 million in the North American segment (Gaston and Dechesne 1996). Most (>95%) of the North American population breeds on islands in SE Alaska (12%), British Columbia (73%) and Washington (13%), with most North American birds concentrated at 8 colonies (Gaston and Dechesne 1996).

### **Seasonal Status in California**

Present in waters off California, Oregon and Washington throughout the year, however, birds move south in a post-breeding dispersal to important wintering areas off California and numbers decline to low levels in the northern two states in winter (Briggs et al. 1987, Briggs et al. 1992). There is also a shift from waters over the continental shelf and at the shelf break during breeding (Morgan et al. 1991, Briggs et al. 1987) to waters seaward of the shelf off California in winter (Briggs et al. 1992). Breeding season extends from early April to early September.

### **Historical Range and Abundance in California**

Rhinoceros auklet breeding populations were extirpated from California circa 1860 (Grinnell 1926). Grinnell and Miller (1944) list the rhinoceros auklet only as a common winter visitor.

### **Recent Range and Abundance in California**

Over the past 30 years, population numbers have increased and birds have re-colonized the historic range (Sowls et al. 1980, LeValley and Evens 1982, Ainley and Boekelheide 1990, Carter et al. 1992) and established a small colony in southern California (McChesney et al. 1995). Numbers remain low, however, as the most recent counts estimated approximately 1,700 individuals breeding in California (Carter et al. 1992). These estimates included 30 sites (Carter et al. 1992, McChesney et al. 1995) although significant numbers occurred at only 3 main colonies: Castle Rock (502 pairs); South Farallon Islands (257 pairs); Año Nuevo Island (33 pairs; Carter et al. 1992). Estimates are rough because of the difficulty censusing this nocturnal, cavity-nesting species. The above estimate at Año Nuevo Island may have been low, as 50% burrow occupancy was assumed, but recent studies have indicated a much higher occupancy rate of self-excavated sand or soil burrows, between 70-95% on Año Nuevo Island from 1993-2001

(PRBO unpublished data). Recent population estimates on Año Nuevo Island have peaked at 123 pairs, largely due to burrow protection measures and installation of artificial burrows (J. Thayer/PRBO unpublished data). No updated population estimates are currently available for other colonies in California, however, at Castle Rock and Southeast Farallon Island recent declines have been suspected (see “Threats” below).

### **Ecological Requirements**

Despite the name, rhinoceros auklets are more closely related to puffins than to auklets. Rhinoceros auklets breed primarily in burrows that they dig, although they will also nest in natural rock crevices or caves. Suitably-placed nest boxes are also occupied (Wilson 1986, Hester 1998, Kuroki et al. 1998). At most colonies, rhinoceros auklets are nocturnal or crepuscular, although diurnal activity has been observed on Southeast Farallon Island (Ainley and Boekelheide 1990; D. Gardner, *pers. comm.*). Birds return to natal regions to breed between ages 3-5 (PRBO unpublished data), and pairs often remain together in successive years (Gardner et al. *in prep*).

Rhinoceros auklets are wing-propelled, pursuit-diving birds, and their diet in California consists mainly of schooling mid-water fishes and squid (Baltz and Morejohn 1977, Morejohn et al. 1978, Hester 1998, Thayer et al. 2000, Sydeman et al. 2001). Prey composition is somewhat variable among colonies and inter-annually. On Southeast Farallon Island in 1987-2000 main food for chicks included Northern anchovy (*Engraulis mordax*), Pacific saury (*Cololabis saira*), squid (*Loligo opalescens*), and juvenile rockfish (*Sebastes* spp.), sablefish (*Anoplopoma fimbria*) and king salmon (*Orchorhynchus tshawytscha*; Sydeman et al. 2001), with rockfish becoming increasingly important in the past two years (PRBO unpublished data). On Año Nuevo Island, between 1993-2000 main prey included anchovy, and to a lesser extent saury, rockfish and squid

(Hester 1998, Thayer et al. 2000), but similarly, rockfish have dominated the diet in 2001-2002 (PRBO unpublished data)

## Threats

Documented and potential threats to the rhinoceros auklets populations in California include exotic mammalian species, oil and chemical contamination, fisheries interactions, human disturbance, burrow trampling, habitat degradation, predation and climate change. Historically, extirpations may have been influenced by introduced mammalian predators such as domestic pets, and competitors, such as the European hare, that may have out-competed rhinoceros auklets for nesting space (Ainley and Boekelheide 1990). The effect of oil spills on rhinoceros auklets has been studied at numerous locations (Smail et al. 1972, Page et al. 1990, Helm et al. 1997, Nur et al. 1997, Sato 1999, Oka and Masaki 2000) and the species' vulnerability is well known. Rhinoceros auklet was the second most impacted species in the *Apex Houston* oil spill off central California, with approximately 1,600 individuals killed or debilitated (Page et al. 1990). Other contaminants such as heavy metals and organochlorines may be of concern in rhinoceros auklets. Egg samples from central California have shown elevated PCB and mercury levels (Sydeman 1996). Additionally, mortalities have been documented in the California gill net fisheries (Forney et al. 2001).

Disturbance and trampling of burrows by humans, pinnipeds, surface nesting or roosting birds (cormorants, pelicans, geese) can cause nest loss, lowered reproductive success, and even adult death (Lewis and Tyler 1987; Hester 1998; J. Thayer, pers. obs.). Loss of vegetation and erosion of nesting habitat has increased on Año Nuevo Island and is suspected on Castle Rock, further compromising burrow integrity. The number of burrows damaged due to soil erosion during the nesting season on Año Nuevo Island has increased from 11% in 1997 to 56% in 2001

(J. Thayer/PRBO unpublished data). In recent years, vegetation loss and erosion at Castle Rock has been caused by thousands of Aleutian Canada geese (*Branta canadensis leucopareia*) that roost there during spring migration (Jaques and Strong 2001).

Predation is a moderate to serious threat at some colonies. Mortality has been documented at Southeast Farallon Island and Año Nuevo Island from peregrine falcons (*Falco peregrinus*) and barn owls (*Tyto alba*; PRBO unpublished data). Adult survival is important for sustainable populations in long-lived species such as rhinoceros auklets. Observed predation at nearshore Año Nuevo Island has ranged from 1%-10% of the population each year in the past ten years (PRBO unpublished data). Survival of adults between 1993-2001 was ~79%, much lower than at offshore Southeast Farallon Island or than other alcid species such as puffins and murres (J. Thayer/PRBO unpublished data). It is unknown how much predation affects this rate, versus other factors such as climate change (see below), but these effects could be modeled. Predation at nearshore Castle Rock is unknown. Such natural predation pressure, when combined with other threats, may affect a colony's long-term sustainability.

Climate change is also a threat as it can cause changes to rhinoceros auklets' prey base. This can impact breeding attempts and reproductive performance as well as adult survival. The Año Nuevo breeding population declined by 20% during the 1998 El Niño event and did not recover to pre-El Niño levels until 2001 (PRBO unpublished data). Reproductive performance on Año Nuevo was also very low in 1998. Low-frequency, or inter-decadal, climate change may further compound effects of inter-annual events. The population on the Farallon Islands has shown a diminishing reproductive performance since 1986, although this trend was not significant (Sydeman et al. 2001).

## **Management and Research Recommendations**

- Determine the health of the population, including population trends, the condition and stability of nesting habitat, the status of prey stocks and fishing activities near colonies, the current predation pressures, and other threats specific to the area.
- Conduct detailed breeding population surveys on main colonies where current numbers are unknown, Castle Rock and the Farallon Islands. Access to Castle Rock is difficult due to the high density of marine mammals and birds sensitive to disturbance, but late August burrow censuses may be feasible. Southeast Farallon trend information may be obtainable from mark/recapture data, especially in conjunction with the novel use of radar for detecting auklets flying in to the colony.
- Investigate impacts of habitat changes, such as loss of vegetation and soil erosion at Año Nuevo Island and Castle Rock, and restore nesting habitats where feasible.
- Examine the relationship between rhinoceros auklets, forage fish resources, and commercial fisheries to evaluate possible impacts and guide fisheries management.
- Continue and expand shipboard Observer programs to document mortality of rhinoceros auklets in gill nets, and develop methods for preventing further entanglement.
- Model effects of current and recent oil spills to estimate impacts to rhinoceros auklets which are seldom recovered, and model impacts of potential spills to determine appropriate levels of rescue and restoration efforts.

## **Monitoring Needs**

The state's breeding population should be monitored periodically (e.g., about every 10 years), preferably during the peak of the incubation period (April and May) or even during the main part

of the breeding season (April to July). This is especially important for rhinoceros auklet colonies with many perceived threats. For example, populations of surface-nesting or roosting birds or pinnipeds should be monitored at important auklet colonies, such as Castle Rock, including assessments of soil erosion caused by these species and its affects on auklet nesting habitat.

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